Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal

Section 1. General administrative information

Annual Coded Wire Tag Program - Missing Production Or Htc (Odfw)

Bonneville project number, if an ongoing project 8906900

Business name of agency, institution or organization requesting funding
Oregon Department of Fish and Wildlife

Business acronym (if appropriate) ODFW

Proposal contact person or principal investigator:

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Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name
None			

NPPC Program Measure Number(s) which this project addresses.
8.4C.3; 8.4D.1; 8.4D.3

NMFS Biological Opinion Number(s) which this project addresses.
NMFS Hydrosystem Operations Biological Opinion- VIII.A.13 (Resonable & Prudent Alternative to the Proposed Action #13).

Other planning document references.
Snake River Recovery Plan (2.1.d.5).

Subbasin.

Work is performed at ODFW hatcheries in the Lower Columbia River and Willamette River Basin. Fish tagged under this project are released in the Columbia River and tributaries below Bonneville Dam, Willamette Basin, and Umatilla and Yakima Rivers.

Short description.
Expand coded wire tag program to include all ODFW Columbia Basin hatchery coho and chinook production releases not tagged by other programs. Monitor hatchery salmon survival trends, evaluate hatchery techniques, provide information for fish management.

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
X	Anadromous fish		Construction		Watershed
	Resident fish		O & M		Biodiversity/genetics
	Wildlife		Production		Population dynamics
	Oceans/estuaries		Research		Ecosystems
	Climate	X	Monitoring/eval.		Flow/survival
	Other		Resource mgmt		Fish disease
			Planning/admin.	X	Supplementation
			Enforcement		Wildlife habitat en-
			Acquisitions		hancement/restoration

Other keywords.
Hatchery Monitoring, Tagging & Marking, Coded-Wire Tagging

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
8906500	Hatchery Production OR/WA/ID (USFWS)	Complimentary project for USFWS hatcheries
8906600	Annual Coded Wire Tag Program - Missing Production WA HTCH (WDF)	Complimentary project for WDF hatcheries

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Insure all ODFW Columbia Basin hatchery coho and	a	Review ODFW Columbia Basin hatchery production schedules to

	chinook production releases have a representative CWT group included in the release.		identify production releases, and identify tagging needs. For 1998 715,000 fish in 24 groups.
		b	Coordinate with ODFW Fish Identification section to perform coded-wire tagging of identified groups.
		c	At least 1 month after tagging sample 500 fish from each CWT group for tag retention and adipose fin clip quality.
		d	Collect release information and file CWT report for each group tagged under objective 1. Data is reported to PSMFC and available through their on-line computer database.
2	Recover coded-wire tags from snouts of fish tagged under Objective 1 and released during 1995 to 1998: (1996 brood coho; 1994 to 1996 brood fall chinook; 1994 to 1996 brood spring chinook).	a	Snouts are collected by region wide fishery sampling programs, and at ODFW hatcheries, and on ODFW spawning ground surveys..
		b	Transport snouts from ODFW hatcheries and spawning ground surveys to the ODFW Fish Identification section for tag recovery and decoding.
		c	Compile and verify sampling and tag data. Report data to PSMFC, available through their on-line computer database.
3	Prepare annual report for all Oregon salmon hatcheries in the Columbia Basin..	a	Report results of coded-wire tagging and tag recovery for 1999.
		b	Compile release and recovery information for all CWT groups released from Oregon Columbia Basin hatcheries.
		c	Calculate percent survival, ocean catch distribution, and freshwater escapement for the last 5 completed brood years for all CWT groups released from

			Oregon Columbia Basin hatcheries.
4	Evaluate the technical, logistic, and biological feasibility of using alternative marking techniques to mark large numbers of juvenile coho salmon.	a	Work with Northwest Marine Technology to coordinate the use of tagging equipment and to provide for training of three to six employees in elastomer visual implant tagging techniques. Acquire necessary equipment, tags, and other supplies.
		b	Tag two groups of 25,000 fish each with elastomer visual implant tags. Tags will be placed in the jaw, each group with a different color. The fish will be juvenile coho salmon at Sandy hatchery, tagged in summer 1999, for release in May 2000.
		c	Differentially coded-wire tag the two groups of 25,000 elastomer visual implant tagged juvenile coho salmon at Sandy hatchery. A control group of 25,000 fish will also be coded-wire tagged with a distinct tagcode under Objective 1.
		d	Collect and record pre-release data pertaining to tag related mortality, fish size, tag retention, and tag visibility.
		e	Collect and summarize data from fish returning in 2000 and 2001. Prepare progress report covering tagging techniques, tag retention and visibility, and survival rates.

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	1/1999	12/1999	61.40%
2	1/1999	12/1999	23.30%
3	11/1999	12/1999	5.70%
4	11/1999	12/1999	9.60%
			TOTAL 100.00%

Schedule constraints.
Production and release of hatchery salmonids in the Columbia Basin is regulated by NMFS under the Endangered Species Act. Specific groups to be tagged depend on funding for the production and tagging of hatchery salmon in Oregon. .

Completion date.
Ongoing

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel	Proj. Supervisor, Tagging Supervisors, Temporary Taggers	$40,276
Fringe benefits	Supervisors @ 35%, Taggers @ 43%	$15,469
Supplies, materials, non-expendable property	Coded-wire tags = $45,900, Visual implant tags = $5,000	$59,790
Operations & maintenance	Obj 2. Tag rec. (est 5,146 @ $7/head)	$36,022
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		$0
PIT tags	# of tags:	$0
Travel	Mileage @ PerDiem	$3,040
Indirect costs	@ 22.9%	$35,403
Subcontracts		$0
Other		$0
TOTAL		$190,000

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	$200,000	$200,000	$210,000	$210,000
O&M as % of total	19.00%	19.00%	19.00%	19.00%

Section 6. Abstract

This program began in 1989 with the understanding that the current level of marking of juvenile hatchery salmon did not provide the necessary data for the level of management decisions needed. The program proposed including a marked group with each production salmon release from Oregon Columbia Basin hatcheries. This increase in marking would provide data for three main goals: evaluate and improve hatchery methods at each facility, contribute to the ability to regulate harvest management,

evaluate the use of artificial production in the basin. The adipose fin clip + coded-wire tag (Jefferts etal 1963) was chose as the method of marking. This program is expected to continue as long as artificial production is used to provide salmon for the Columbia Basin, and there is a need to monitor and evaluate such production.

Section 7. Project description

a. Technical and/or scientific background.

Prior to this project not all Oregon hatchery salmon production releases in the Columbia Basin had an associated tagged group. Harvest information (survival, catch distribution, catch contribution, age composition, size at age) had to be inferred from the closest, often experimental, tagged group. This precluded post-release monitoring and evaluation of specific hatcheries, or production strategies within a hatchery. Therefore, hatcheries were evaluated based on numbers and weights of juveniles released rather than on adults produced. The first three objectives of this project (see Section 3 above) establish a program to address these concerns through the establishment of a comprehensive post-release production monitoring program at Oregon Columbia Basin salmon hatcheries. This expanded marking program is called for in the 1994 Fish and Wildlife Program in Section 8 (8.4D.1). It is also the implementation of data collection needed for fishery model refinements as called for in Section 8 (8.4D.3). The need for a hatchery monitoring and evaluation program is also identified in other basin plans. The Snake River Recovery Plan (2.1.d.5) and the Hydrosystem Operations Biological Opinion (VIII.A.13) both call for establishment of a comprehensive monitoring, evaluation and research program. The final objective of this project (see Section 3 above) is an evaluation of a mass marking technique. There is a well documented need to identify all hatchery fish in the basin for a variety of reasons including; monitoring straying rates of hatchery fish into wild spawning areas, removal of hatchery fish at fish trapping locations to prevent them from straying to wild spawning areas, and selective harvest of hatchery fish. Evaluation of mass marking techniques is specifically called for in the 1994 Fish and Wildlife Program in Section 8 (8.4C.3).

Key project personnel have worked on a similar coded-wire tagging project (Lewis 1996). This is also a hatchery production monitoring project involved with coded-wire tagging hatchery salmon. This project concentrates on ODFW coastal hatcheries. I have also worked on other mark-recapture projects (Williams etal 1990). This is an exploitation rate indicator stock monitoring project involving hatchery fall chinook salmon in an Oregon coastal Basin, Salmon River. Returning adult salmon were marked and released back to the river to estimate total ocean escapement.

b. Proposal objectives.

Objective 1) Insure all ODFW Columbia Basin hatchery coho and chinook production releases have a representative CWT group included in the release. This will create a comprehensive fishery management tool and hatchery evaluation database for all Oregon Coulmbia Basin hatchery coho and chinook salmon production.

All data will be available to the public through PSMFC. Specific numbers of fish to be tagged in 1999 will depend on hatchery production goals and other tagging funding for the 1998 brood year. These will not be determined until late summer 1998. However, tagging numbers for 1999 should be similar to 1998. Planned tagging in 1998 for this project includes:

a) 3 groups of 50,000 CWT fall chinook salmon with an expected survival of about 0.5%,

b) 2 groups of 25,000, 3 groups of 30,000, and 1 group of 50,000 CWT spring chinook salmon with an expected survival of about 1.0%,

c) 14 groups of 25,000 CWT coho salmon with an expected survival of about 1.0%.

For a total of 690,000 fish in 23 CWT groups.

Objective 2) Recover coded-wire tags from snouts of fish tagged under Objective 1 and released during 1995 to 1998: (1996 brood coho; 1994 to 1996 brood fall chinook; 1994 to 1996 brood spring chinook). The goal is to have data from all tags recovered in 1999 available to the public through PSMFC by summer 2000. Salmon with a CWT are readily identified in the field by their adipose fin clip, or through electronic means for mass marked coho salmon. However, the specific tagcode can not be readily or easily determined in the field. Since recoveries occur and the data is used throughout the regioin it is essential that all tags and recovery data be read, data entered, varified, and available though standardized forms and methodologies. Thus acuarate and reliable data is available to all users regionwide.

Objective 3) Prepare annual report for all Oregon salmon hatcheries in the Columbia Basin. The report documents work performed for the year under this contract as well as summarizes data for the last five years for all ODFW Columbis Basin CWT groups. This provides a general reference for results of the project as well as base line data analysis including numbers released, percent survival, ocean catch distribution, and freshwater catch and escapement. The report is to be completed 90 days after the end of the contract period, March 31, 2000 for the 1999 contract.

Objective 4) Evaluate the technical, logistic, and biological feasibility of using alternative marking techniques to mark large numbers of juvenile coho salmon. Initial work with Photonic tagging experienced technical problems and the emphasis was switched to visual implant tagging. Specific hypotheses include:

a) No difference in mortality, growth, or disease occurance during hatchery rearing. Assumes results with Sandy hatchery coho are representative of other hatchery coho, random assignment of fish to treatment and control groups, equal feeding rates between groups, acurate determination and recording of test variables.

b) Tags are retained and visibale throughout the fishes life. Assumes results with Sandy hatchery coho are representative of other hatchery coho, random assignment of fish to treatment and control groups, marked adults are recognized and correctly assigned to treatment or control groups, results at

the hatchery (maturing fish) are representative of ocean caught (imature fish).

c) No difference in post-release survival, growth, age composition or sex composition. Assumes results with Sandy hatchery coho are representative of other hatchery coho, random assignment of fish to treatment and control groups, marked adults are recognized and correctly assigned to treatment or control groups.

c. Rationale and significance to Regional Programs.

The rationale for the project is to provide comprehensive hatchery salmon production monitoring data to regional management entities. The data generated from this program will be useful, if not essential, in many goals and objectives of the 1994 Fish and Wildlife Program including the following. Survival and harvest information for Columbia Basin hatcheries is essential for determining prioritization and cost effectiveness of program measures (3.2E.1). Expanded marking of hatchery fish will be useful in determining which hatchery populations are appropriate indicators for specific wild fish populations in the basin (4.3C.1). Hatchery marking programs are essential in monitoring achievement of hatchery performance standards (7.2A.6). Data from this marking program will be essential in the hatchery evaluations called for in Section 7 (7.2B). Some of the groups tagged by this project are released in terminal areas and will be helpful in the exploration and evaluation of terminal fishing opportunities (8.3C.1).

This project is one of three BPA funded coded-wire tagging projects to insure comprehensive monitoring and evaluation of all Columbia Basin Hatchery salmon production. The other projects are a USFWS project “Hatchery Production OR/WA/ID (USFWS)” (#8906500) and a WDFW project “Annual Coded Wire Tag Program - Missing Production WA HTCH (WDFW)” (#8906600). This project also works cooperatively with the Pacific Salmon Commission tagging program to insure adequate tagging of indicator stocks as called for in the Pacific Salmon Treaty. The project cooperates with established ODFW programs for the actual coded-wire tagging and tag recovery (ODFW Fish Identification Section) and with the Stock Assessment project to insure production monitoring at all ODFW hatcheries.

d. Project history

This project began in 1989 with the project number 89-069. The project name and number have remained essentially the same since then, Project #: 8906900, Project Name: Annual Coded Wire Tag Program - Missing Production OR HTC (ODFW). This project was the result of a research proposal from the Northwest Power Planning Council’s Hatchery Effectiveness Technical Work Group, because of its direct association with their priority projects 2, 4 and 6. The monitoring and evaluation group, at their January 1989 meeting, went on record as supporting this project as a high basin priority. A committee of agencies and Tribal scientists met to approve the “experimental design”, prior to origianal submission of this project. Similar projects were developed for

other agencies releasing hatchery salmon in the Columbia Basin (see Section 3 above). The project was originally designed to provide information relavent to the Columbia River Fish and Wildlife Program at that time. Specifically to provide data for evaluation and improvement of hatchery methods a each facility (Measuse 200), provide data to contribute to regulationof harvest management (Measure 500), and provide data on the use of artificial propagation (Measure 700).

The project is currently starting its tenth year. Total BPA obligations over the first 9 years is $1,092,964, for an average of $121,440 per year. In that time frame the project has coded-wire tagged 8.15 million juvenile salmon (905,000 per year). Through 1997 there have been over 18,000 tags recovered from fish tagged under this project. In 1992, as tag recoveries began, the project began producing and annual report documenting tagging and tag recovery results. Also reported in the annual report is CWT release and recovery data for all Oregon Columbia Basin CWT groups (most recent report Lewis etal 1997). Information obtained from fish tagged under this project is used to adjust hatchery rearing and release plans, prioritize hatchery production programs, and evaluate and adjust harvest management strategies.

e. Methods.

Objective 1) Insure all ODFW Columbia Basin hatchery coho and chinook production releases have a representative CWT group included in the release. Specific tasks and methods follow:

a) Determine groups to be tagged and number of fish to tag. This is a three step process. First all production releases are identified, based on program intent (ongoing regular production to produce smolts), number of fish released (50,000 or more), and fish of an acceptable size (at least 2.0 gm/fish). Second, groups with adequate tagging funded by other sources are eliminated from the list. Finally, the number of fish to tag is determined based on the expected surival, generally 25,000 to 50,000 fish per group.

b) The identified groups of fish are tagged based on the manufactures recommendations and standard techniques for coded-wire tagging (Jenkinson and Bilton 1981).

c) Pre-release checks of 500 fish per group (PSC 1995) are made at least 4 weeks after tagging (Blankenship 1981).

d) All release information is reported to the Pacific States Marine Fisheries Commision and is available on their on-line computer database.

Objective 2) Recover coded-wire tags from snouts of fish tagged under Objective 1. Specific tasks and methods follow:

a) Snouts collected from marked fish sampled in fisheries, hatcheries, and other recovery areas are frozen and transported to the ODFW Fish Identification head Lab in Clackamas, Oregon.

b) Tags are recoverd, read and stored using standard techniques. Tags recoverd by other agencies are sent to the Clackams lab for verification.

c) All recovery information is reported to the Pacific States Marine Fisheries Commision and is available on their on-line computer database.

Objective 3) Prepare annual report. Specific tasks and methods follow:

a) Compile release and recovery information from all CWT groups released in the Columbia Basin by ODFW.

b) Calulate survival (total estimated recoveries/number of tagged fish released) and catch distribution (percent of total recoveries by location) for each CWT group. Calculate 5 year averages of the above information by hatchery program (species/stock/release location) and display graphically.

c) Compile and submit report to BPA by 90 days after end of contract. Report published by BPA.

Objective 4) Evaluate the technical, logistic, and biological feasibility of using alternative marking techniques to mark large numbers of juvenile coho salmon. This study should continue for 3 years. Specific tasks and methods follow:

a) Mark two groups of 25,000 juvenile coho salmon at Sandy hatchery in summer 1999. Each group will receive a distinct code-wire tag (in the snout), an adipose fin clip, and a distinct color visual implant tag (in the jaw).

b) Collect and record data during hatchery rearing (from tagging through release) including daily mortality, daily amounts fed, monthly fish size, and monthly disease checks.

c) Pre-release checks of 500 fish per group (PSC 1995) are made at least 4 weeks after tagging (Blankenship 1981). Both groups and a control group (adipose fin clipped and coded-wire tagged under objective 1) will be released in May 2000.

d) Coho salmon jacks (2000) and adults (2001) collected at Sandy hatchery will be checked for fin clips and visual implant tags. Marked fish will be sampled for gender, length, and have their snouts removed for CWT recovery.

The adipose fin clip + coded-wire tag (Jefferts etal 1963) was chose as the method of marking because its use is well established in the region, there is a regionwide sampling program for this mark, and there is an established regional data reporting, storing, and access system. In 1989 a committee of agency and tribal scientists recommended the minimum number of fish tagged for this project be based on producing a minimum of 30 actual tag recoveries per group. Based on historic levels of survival, harvest, and sampling the following levels of tagging should meet that goal; tag 25,000 for groups with expected survivals of 0.5% or higher, and tag 50,000 for groups with expected survivals of 0.5% or lower. Some groups of 30,000 are used for Willamete Basin spring chinook to maintain equal sample size with ongoing ODFW research projects funding other tagging at those hatcheries. These levels generally agree with Reisenbichler and Hartmann (1978) who found recommended tagging 25,000 fish per group for estimation of fish contribution. However, the increasing complexity of fisheries management regimes requires much higher levels of tagging (Hankin and Mohr 1990).

As a mark recapture project there are several critical assumptions including. 1) Adequate funding and staffing for sampling harvest and/or adult recovery areas. 2) Marked fish suffer the same natural mortality as unmarked fish. 3) Marked fish do not

lose their marks. 4) All marks are recognized during sampling. As the technologies employed by this project are well established there are no special animal care or environmental protections required beyond the standard methodologies used for tagging. Since this project monitors existing activities we anticipate no change in existing risks to habitat, wild fish or wildlife directly related to this coded wire tagging project. Results of the project may provide data that can be used to reduce risks to other stocks through changes in management of hatchery production. Comparisons between different groups are analyzed by a two way ANOVA (treatments by years). Differences are considered statistical significant at $P \leq 0.05$. Visual implant tagging will be evaluated for cost, survial, mark retention, and mark visibility (pre and post release). Project results are monitored through annual reports and by reporting of all release and recovery information for coded-wire tagged groups through the Pacific Sataes Marine Fisheries Commission. Results include monitoing and tracking trends in hatchery salmon survival, harvest, and escapement. This information will be used to evaluate hatchery performance and in managing fisheries.

f. Facilities and equipment.

Coded-wire tagging for this project is performed at Oregon Columbia Basin hatcheries including: Big Creek, Bonneville, Cascade, McKenzie, Oxbow, Sandy, South Santiam, South Fork Klaskanine, and Willamette. For locations and descriptions of Oregon Columbia Basin salmon hatcheries see Lewis (1996a). Actual coded-wire tagging is performed by the ODFW Fish Identification section using standard tagging vans. Tagging vans are equipped with flowing water live tanks, anesthetic trays, flowing water recovery trays, and flowing water return tubes. Tagging is done with North West Marine Technology equipment including Mark 4 tagging machines and quality control devices. Tag recovery is done at the ODFW Fish Identification Head Lab in Clackamas, Oregon. Tags are recovered and read using standardize techniques, and equipment. These are the same tagging and tag recovery equipment used for all ODFW CWT projects. Equipment for alternative tagging techniques, Objective 3, will be supplied by the manufacturer.

Equipment and facilities needed for this project are available and adequately. No special or high-cost equipment purchases are currently anticipated.

g. References.

Blankenship, L. 1981. Coded-wire tag loss study. Washington Department of Fisheries, Technical Report No. 65, Olympia, Washington.

Hankin, D.G. and S.M. Mohr. 1990. Determination of levels of coded-wire tagging needed to support time/area harvest management. Final contract report to Klamath River Technical Advisory Team.

Jefferts, K.B., P.K. Bergman, and H.F. Fiscus. 1963. A coded-wire identification system for marcro-organisms. Nature 198:460-462.

Jenkinson, D.W., and H.T. Bilton. 1981. Additional guidelines to marking and coded wire tagging of juvenile salmon. Canadian Technical Report of Fisheries and Aquatic Sciences No. 1051. 24 pages.
Lewis, M.A. 1996. Stock Assessment of anadromous salmonids. Oregon Department of Fish and Wildlife, Annual Progress Report, Portland, Oregon.
Lewis, M.A. 1996a. Review of capacity utilization at ODFW salmon hatcheries. Oregon Department of Fish and Wildlife, Information Report 96-8, Portland, Oregon.
Lewis, M.A., C. Mallette, and W.M. Murray. 1997. Annual coded wire tag program, Oregon missing production groups. Annual Report 1996, Bonneville Power Administration, Portland, Oregon.
Pacific Salmon Commission (PSC). 1995. Hatchery methodology workshop. Held January 10th through 12th 1995, Seattle, Washington.
Reisenbichler, R.R., and N.A. Hartmann. 1978. Effect of number of marked fish and years of repetition on precision in studies of contribution to a fishery. Oregon Department of Fish and Wildlife, Information Report 78-2, Portland, Oregon.

Section 8. Relationships to other projects

Tagging requirements and funding of tagging at ODFW hatcheries is planned cooperatively between this project, the ODFW Stock Assessment Project, the Pacific Salmon Commission tagging program for Oregon ,and ODFW field staff. All tagging, tag recovery and data reporting for ODFW (irrespective of funding source for the tagging) is done through a central ODFW Fish Identification Section. Thus equipment, personnel and expertise is shared among all projects funding tagging at ODFW hatcheries. The ODFW CWT program in conjunction with other CWT programs in the Columbia Basin, including the two BPA funded projects identified in Section 3 (project numbers 8906500 and 8906600), provide a comprehensive monitoring program for Columbia Basin hatchery salmon production. Coordination and regulation of region wide tagging and tag recovery is handled through the Pacific States Marine Fisheries Commission (PSMFC). This provides for region wide consistence in tagging programs, data collection and data sharing.

Section 9. Key personnel

Project Manager: Mark Lewis
Title: Special Projects (Natural Resource Specialist 2)
FTE/Hours: Full time position, 1.0 FTE. Time on this project 4 months/year, 0.33 FTE.
Duties on this Project: Write project proposals and project work statements, develop and track project budget, determine groups for tagging, coordinate tagging and tag recovery with ODFW Fish Identification Section, perform pre-release tag retention and fin clip quality checks, file CWT release reports, write annual reports, summarize and analyze data collected, prepare and deliver oral and written presentations of project results as needed.

Other ODFW employees involved with this project include: Christine Mallette Fish Identification Section supervisor; Bill Murray tag recovery supervisor; Hal Boldt, Joyce Bonds, Stan Brzycki, Bill Close, Bill Haugen, Randy Johnson, Gene Thoming, and Linda Wernick tagging supervisors and/or tag processors.

Resume

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College: Oregon State University, Graduated June 1986

Bachelors Degree in Fisheries Science, and Bachelors Degree in Wildlife Science

Current Employer: Oregon Department of Fish and Wildlife.

Assigned to special projects in the Freshwater Management Section of the Fish Division. Duties include: Project Manager for BPA contract; Project Manager for NMFS CWT contract; other projects, as assigned.

Recent Employment History: Current Position – March 1990 to Present.

North Coast Crew Chief – January 1990 to March 1990. Natural Resource Specialist 1 position with the ODFW Ocean Salmon Management Section. Assistant project manager for two projects; Sampling of Northern Oregon ocean salmon fisheries, and Salmon River fall chinook indicator stock project.

Seasonal Sampler – June 1986 to December 1989. Experimental Biological Aide position with various ODFW projects including: Oregon ocean sport and commercial fishery sampler, summer 1986, 1987, 1988. Oregon coastal salmon spawning ground surveyor, fall/winter 1986-87. Salmon river fall chinook indicator stock study, fall/winter 1987-88, 1988-89. Willamette River spring chinook creel, spring 1988. Salmon scale reader, summer 1989. Salmonid habitat research project, fall/winter 1989.

Foreign Fisheries Observer Program – July 1985 to September 1985, March 1987 to May 1987. Position with NMFS, subcontracted through OSU, collect biological and fishery management data from joint venture ground fish fishery in Bering Sea.

Expertise:

This project is essentially a mark-recapture project with hatchery salmon. My degrees in fisheries and wildlife science provide the biological and technical background to perform this kind of project. My work experience includes mark-recapture studies with juvenile wild salmon (salmonid habitat research project) and adult salmon (Salmon River fall chinook indicator stock project). I also have experience with the CWT technology including, tagging and sampling the various areas CWT fish are recovered. Computer use, data compilation and analysis, and report preparation skills have been developed through college courses and projects, as well as through my work experience on various projects.

Recent Publications and Job Completions:

Ewing, R.D., T.R. Walters, M.A. Lewis, and J.E. Sheahan. 1994. Evaluation of Inventory Procedures for Hatchery Fish. I. Estimating Weights of Fish in Raceways and Transport Trucks. Progressive Fish-Culturist. 56:153-159.

M.A. Lewis, T.R. Walters, and R.D. Ewing. 1994. Evaluation of Inventory Procedures for Hatchery Fish. II. Variation in Specific Gravities of Pacific Salmonids During Rearing. Progressive Fish-Culturist. 56:160-168.

Lewis, M.A. 1996a. Review of capacity utilization at ODFW salmon hatcheries. Oregon Department of Fish and Wildlife, Information Report 96-8, Portland, Oregon.

Lewis, M.A. 1996b. Stock Assessment of anadromous salmonids. Oregon Department of Fish and Wildlife, Annual Progress Report, Portland, Oregon.

Lewis, M.A., C. Mallette, and W.M. Murray. 1997. Annual coded wire tag program, Oregon missing production groups. Annual Report 1996, Bonneville Power Administration, Portland, Oregon.

Section 10. Information/technology transfer

Release information for all CWT groups released by ODFW in 1999 will be reported to PSMFC by early 2000. Recovery information for all CWT fish recovered by ODFW in 1999 will be reported to PSMFC by summer 2000. This information will be available on PSMFC's on-line computer database for the region wide CWT program. An annual report "Annual Coded Wire Tag Program: Oregon Missing Production Groups" (Lewis et al 1997) is produced for this project. This report includes release and recovery data for all CWT groups released by ODFW in the Columbia Basin system (including those funded by other programs). Data from this project is also used in an ODFW annual report "Stock Assessment of Anadromous Salmonids" (Lewis 1996b) that reports release and recovery information for CWT groups released from coastal hatcheries and some Columbia Basin hatcheries. Information from this and other ODFW tagging projects is used to evaluate and adjust hatchery rearing and release techniques, to develop and evaluate fishery management decisions, prioritize hatchery production programs, evaluate hatchery/wild salmon interactions, and to monitor long-term trends in hatchery salmon production.